

# Yanqi (Grace) Luo

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## EDUCATION

- University of California San Diego (UCSD)** — *NanoEngineering, Ph.D.* 07/2015 - 07/2020  
*Thesis: Revealing Composition-Performance Relationships In Organometal Perovskite Solar Cells By Correlative Microscopy*
- California Polytechnic State University San Luis Obispo** — *Polymer, M.S.* 09/2013 - 08/2014  
*Thesis: Interfacial Interactions between Carbon Nanoparticles and Conjugated Polymers*
- California Polytechnic State University San Luis Obispo** 09/2009 - 06/2013  
*Chemistry, B.S., Computer Science, Minor*

## GRANTS AWARDED

- Lab Directed Research and Development (LDRD, Argonne National Laboratory) — \$500,000 2021  
*Lead PI: technical development for enabling nanoprobe-based in-situ multimodal studies on energy materials*

## FELLOWSHIP AWARDS

- Werner Meyer-Ilse Memorial Award 2022  
*Awarded to young scientists for exceptional contributions to the advancement of x-ray microscopy*
- Outstanding Postdoctoral Performance Award 2022  
*Awarded in applied engineering research*
- Marye Anne Fox Endowed Fellowship 2019  
*Awarded to 2 Ph.D students who have a highly distinguished research record among UCSD graduate students*
- Portland Cement Association Research Fellowship 2016
- University of California Carbon Neutrality Initiative Fellowship, 2015
- OE-A Demonstrator Competition 2014  
*Awarded First Place*
- Cal Poly SLO CIEF Polymer and Coating Scholarship 2012

## SERVICES AND OUTREACH

- APS/CNM User Meeting — *Argonne National Laboratory* 2022  
*Workshop Organizer, Multi-modal X-ray imaging using multiple APS beamlines.*

## RESEARCH AND PROFESSIONAL EXPERIENCE

- Postdoctoral Researcher** — *Argonne National Laboratory. Supervisor: Dr. Si Chen* 08/2020 - Present
- Leading *in-situ* / *operando* synchrotron X-ray nanoprobe characterization development upon integrating visible photon illumination and photoluminescence imaging capability at various beamlines to study light-induced dynamics and structural evolution in energy harvesting and biological materials
  - Implemented feature-based image registration approaches for both correlative analysis on multiscale and multimodal microscopic data and spatial feature alignment on improving 3D tomographic reconstruction
  - Developed / Deployed graphical batch scan user interface (GUI) that allowed users to interact with motors and drivers remotely at nanoprobe beamline
- Graduate Student Researcher** — *UCSD. Advisor: Prof. David Fenning* 07/2015 - 07/2020
- Fabricated lead halide perovskite semiconducting energy harvesting photovoltaic devices in p-i-n architecture
  - Utilized synchrotron-based X-ray fluorescence / diffraction, E-beam and laser induced current mapping on devices with various compositions to reveal composition-structural-performance relation in micro-/nano scale
- Senior R&D Chemist** — *Nusil Technology LLC* 08/2014 - 06/2015
- Developed silicon-based polymer electronic materials and scale-up manufacturing processes by conducting research, analysis, synthesis, and experimentation under cGMP guidances
- Graduate Research Assistant** — *Cal Poly SLO* 09/2012 - 08/2014
- Investigated crystallization kinetics of conductive polymer (P3HT) influenced by the presence of single-wall carbon nanotubes (SWNTs), graphene and graphene oxide

- Experienced in synthesized polymer and performed mechanical stressed testing to study properties of polymer coating upon incorporating nanomaterials.

## SKILLS AND QUANLIFICATIONS

- Strong project management skills such as budgeting fiscal year expense, hiring/mentoring postdoctoral researcher, and writing proposals and project plannings.
- More than 10 years of experience in inorganic materials chemistry
- More than 7 years of synchrotron experience
- Substantial knowledge in thin film synthesis and device fabrication
- Author and co-author of 30+ peer-reviewed journal publications demonstrating versatility in writing and productivity
- Strong hands-on experience on hardware / software integration for building customized instrumentation system
- Proficient in optoelectronic device and thin film characterizations including: LBIC, EBIC, XBIC, PL, UV-Vis, EQE, JV, SEM, XRF, EDX, XRD and AFM
- Proficient in big data processing and data analytic using numpy, pandas, keras, tensorflow in Python environment
- Proficient in image processing and segmentation using openCV and skimage package

## SELECTED PEER-REVIEWED JOURNAL PUBLICATIONS

Full publication list: [Google Scholar](#). Number of first-author publications: 9, Citations: 1493, H-index: 17

15. N. Rahman, S. Wiegold, D. Sheyfer, B. Lai, J.-P. Correa-Baena, **Y. Luo**, Chlorine Induced Photoactive CsPbI<sub>3</sub> Formation in Halide Perovskite Solar Cells, 2022, *in preparation*
14. **Y. Luo**, S. Zhang, J.-S. Chen, X Ma, J Deng, Y Jiang, L Li, B Lai, S Chen, S Wiegold, L Dou, "Light-Induced Halide Diffusion in 2D Lateral Heterostructures Halide Perovskite Crystals", 2022, *in preparation*
13. **Y. Luo**, *et al.* "A Reliable Workflow for Improving Nanoscale X-ray Tomographic Analysis on Nanoparticle Treated HeLa Cells", *Metallomics*, 14 (9), 2022
12. Sarah. Wiegold, **Y. Luo**, *et al.* "Impact of transition metal doping on structural and optical properties of halide perovskites" *Chemistry of Materials*, 33 (15), 6099, 2021
11. **Y. Luo**, *et al.* "Quantitative Specifications to Avoid Degradation during E-beam and Induced Current Microscopy of Halide Perovskite Devices," *The Journal of Physical Chemistry C*, 124, 18961, 2020
10. N. Li†, **Y. Luo**†, *et al.* "Microscopic Degradation in Formamidinium-Cesium Lead Iodide Perovskite Solar Cells under Operational Stressors," *Joule*, 4 (8), 2020 (†- co-first author)
9. R. Wang, J. Xue, K.-Li. Wang, Z.-K. Wang, **Y. Luo**, *et al.* "Constructive Molecular Configurations for Surface-Defect Passivation of Perovskite Photovoltaics," *Science*, 366 (6472), 1509, 2019
8. X. Li, **Y. Luo**, M. Holt, Z. Cai, D. P. Fenning, "Residual Nanoscale Strain in Cesium Lead Bromide Perovskite Reduces Stability and Shifts Local Luminescence," *Chemistry of Materials*, 31 (8), 2778, 2019
7. J.-P. Correa-Baena†, **Y. Luo**†, *et al.* "Homogenized Halides and Alkali Cation Segregation in Alloyed Organic-Inorganic Perovskites," *Science*, 363 (6427), 627, 2019 (†- co-first author)
6. **Y. Luo**, *et al.* "The Relationship between Chemical Flexibility and Nanoscale Charge Collection in Hybrid Halide Perovskites," *Advanced Functional Materials*, 28 (18), 1706995, 2018
5. **Y. Luo**, *et al.* "Direct Observation of Halide Migration and Its Effect on the Photoluminescence of Methylammonium Lead Bromide Perovskite Single Crystals," *Advanced Materials*, 29 (43), 1703451, 2017
4. **Y. Luo**, *et al.* "Spatially Heterogeneous Chlorine Incorporation in Organic-Inorganic Perovskite Solar Cells" *Chemistry of Materials*, 28 (18), 6536, 2016

Before UC San Diego

3. J. P. Abdou, G. A. Braggini, **Y. Luo**, A. R. Stevenson, D. Chun, S. Zhang, "Graphene-Induced Oriented Interfacial Microstructures in Single Fiber Polymer Composites," *ACS Applied Materials & Interfaces*, 7 (24), 13620, 2015
2. **Y. Luo**, *et al.* "Nematic Order Drives Macroscopic Patterns of Graphene Oxide in Drying Drops," *Langmuir*, 30 (48), 14631, 2014
1. **Y. Luo**, *et al.* "Dynamic Interactions between Poly(3-Hexylthiophene) and Single-Walled Carbon Nanotubes in Marginal Solvent," *The Journal of Physical Chemistry B*, 118 (22), 6038, 2014